AMENDMENTS TO THE CLAIMS

Please amend the claims as indicated below. The language being added is underlined ("__") and the language being deleted contains either a strikethrough ("—") or is enclosed by double brackets ("[[   ]]").

LISTING OF CLAIMS

1. (Currently Amended) A method of encoding Quadrature Amplitude Modulation (QAM) trellis coded data signals, comprising:

receiving data bits and inputting into a Trellis encoder;

encoding some of the received data bits using a Trellis state machine;

employing a 4/5 convolutional encoder to encode the data bits;

generating a redundant data bit $\underline{u_0}$ using a six stage state machine;

mapping all of the data bits onto a constellation according to the equations:

$$\underline{v'_2 = u_5}$$

$$\underline{v'_1 = u_1 \oplus u_3}$$

$$\underline{v'_0 = u_3}$$

$$\underline{w'_2 = u_4 \oplus u_5}$$

$$\underline{w'_1 = u_0 \oplus u_1 \oplus u_2 \oplus u_3}$$

$$\underline{w'_0 = u_2 \oplus u_3}$$

wherein $\underline{u_1, u_2, u_3, u_4}$ are the encoded bits; $\underline{u_5}$ is an uncoded bit, $\underline{u_0}$ is the redundant bit, and wherein $\underline{v'_0, v'_1, v'_2, w'_0, w'_1, w'_2}$ are input into discrete multi-tone (DMT) bins; and

forcing the Trellis state machine to return to zero state.

2. (Original) The method of claim 1, wherein the Trellis encoder is a 4-D 64 state encoder.

3. (Original) The method of claim 1, wherein in a 2-D QAM constellation is partitioned into an 8 2-D cosets.

4. (Original) The method of claim 3, wherein the 2-D cosets are further partitioned into 32 4-D cosets by combining the constellation of two DMT bins.

5. (Original) The method of claim 1, wherein the overall mean squared distance between any two neighboring signals is $5d^2_0$.

6. (Original) The method of claim 1, wherein the coding gain is 5.63 dB

7. (Original) The method of claim 1, wherein the Trellis branch diagram is generated by a six stage finite state machine that creates a redundant bit from four input bits.

8. (Original) The method of claim 1, wherein forcing of the Trellis state machine to return to zero state is applied at the end of each DMT symbol.

9. (Original) The method of claim 10, wherein even-numbered bits are mapped onto the constellation using 3 bits per bin.

10. (Original) The method of claim 1, wherein odd-numbered bits are mapped onto the constellation using 3 bits per bin.

11. (Currently Amended) An apparatus for encoding Quadrature Amplitude Modulation (QAM) trellis coded data signals, comprising:

a Trellis encoder for receiving data bits to be inputted therein;

a Trellis state machine for encoding some of the received data bits;

a 4/5 convolutional encoder to encode the data bits;

a six stage state machine for generating a redundant data bit; and

a mapper for mapping all of the data bits onto a constellation, wherein the mapper maps according to the equations:

$$v'_2 = u_5$$

$$v'_1 = u_1 \oplus u_3$$

$$v'_0 = u_3$$

$$w'_2 = u_4 \oplus u_5$$

$$w'_1 = u_0 \oplus u_1 \oplus u_2 \oplus u_3$$

$$w'_0 = u_2 \oplus u_3$$

wherein v'_0, v'_1, v'_2, w'_0, w'_1, w'_2 are input into discrete multi-tone (DMT) bins; u_1, u_2, u_3, u_4 are the encoded bits; u_5 is an uncoded bit, and u_0 is a redundant bit.

12. (Original) The apparatus of claim 11, wherein the Trellis encoder is a 4-D 64 state encoder

13. (Original) The method of claim 11, wherein in a 2-D QAM constellation is partitioned into an 8 2-D cosets.

14. (Original) The apparatus of claim 13, wherein the 2-D cosets are further partitioned into 32 4-D cosets by combining the constellation of two DMT bins.

15. (Original) The apparatus of claim 11, wherein the overall mean squared distance between any two neighboring signals is $5d^2_0$.

16. (Original) The apparatus of claim 11, wherein the coding gain is 5.63 dB

17. (Original) The apparatus of claim 11, wherein the Trellis branch diagram is generated by a six stage finite state machine that creates a redundant bit from four input bits.

18. (Original) The apparatus of claim 11, wherein forcing of the Trellis state machine to return to zero state is applied at the end of each DMT symbol.

19. (Original) The apparatus of claim 11, wherein even-numbered bits are mapped onto the constellation using 3 bits per bin.

20. (Original) The apparatus of claim 11, wherein odd-numbered bits are mapped onto the constellation using 3 bits per bin.